

UNCLASSIFIED

EXHIBIT R-2, FY 2001 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 2000

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603800N

PROGRAM ELEMENT TITLE: JOINT STRIKE FIGHTER (JSF) PROGRAM

(U) COST (Dollars in thousands)

PROJECT NUMBER TITLE	FY 1999 ACTUAL	FY 2000 BUDGET	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	FY 2004 ESTIMATE	FY 2005 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
D2209 JSF	471,290	239,907	131,566	0	0	0	0	0	1,742,506

Quantity of RDT&E Articles 4

(U) A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The Joint Strike Fighter (JSF) Program will develop and field an affordable, highly common family of next generation strike fighter aircraft for the USN, USMC, USAF and allies. Current program emphasis is on facilitating the evolution of fully validated and affordable joint operational requirements, and demonstrating cost leveraging technologies and concepts to lower risk prior to entering Engineering and Manufacturing Demonstration (E&MD) in FY 2001. This is a joint program with no executive service. Navy and Air Force each provide approximately equal shares of annual funding for the program. The United Kingdom is a collaborative partner in this phase of the program and several other countries also participate.

(U) JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under DEMONSTRATION & VALIDATION because it integrates hardware for test related to specific ship or aircraft applications.

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EXHIBIT R-2a, FY 2001 RDT&E,N BUDGET PROJECT JUSTIFICATION SHEET

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D2209									
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(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1999 ACCOMPLISHMENTS: (Breakout reflects Navy, Air Force, United Kingdom, Multi-Lateral, Canadian and Italian funding)

- (U) (\$762,415) Continued Concept Demonstration efforts by Boeing, Lockheed Martin and Pratt & Whitney including company unique technology demonstrations, completed final design and continued build of Concept Demonstrator Aircraft (CDA) and continued concept refinement for a tri-service family of aircraft.

- (U) (\$ 40,153) Continued the Alternate Engine Program.

- (U) (\$141,580) Continued technology maturation demonstrations and assessments in the areas of airframe, flight systems, manufacturing and producibility, propulsion and mission systems. Completed approximately half of the demonstrations. Continued systems engineering support for the Concept Demonstration Phase in the areas of system test, air vehicle analysis and integration, advanced cost estimating, survivability, integrated flight and propulsion control and carrier suitability.

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- (U) (\$ 9,341) Continued technology maturation demonstrations and assessments in the areas of supportability and training and prognostics and health management.
- (U) (\$ 13,307) Continued modeling and simulation activities to support strike warfare mission area analysis and requirements analysis efforts including COPT to facilitate the Services' joint requirements definition. Continued requirements analysis in support of final requirements document. Continued modeling and simulation support testing, training, and refinement of concept of operations for the weapons system (simulation based acquisition).
- (U) (\$ 15,227) Continued mission support, including program office functions.
- (U) (\$982,023) Total

2. (U) FY 2000 PLAN: (Breakout reflects Navy, Air Force, United Kingdom, Multi-Lateral and Canadian funding)

- (U) (\$394,892) Continue Concept Demonstration efforts by Boeing, Lockheed Martin and Pratt & Whitney including ground and flight demonstrations, areas of technology maturation and concept refinement for a tri-service family of aircraft. Request proposals from contractors for their designs and E&MD programs.
- (U) (\$ 26,190) Continue the Alternate Engine Program.
- (U) (\$ 68,554) Continue technology maturation demonstrations and assessments in the areas of airframe, flight systems, manufacturing and producibility, propulsion and mission systems. Continue systems engineering support for the Concept Demonstration Phase in the areas of system test, air vehicle analysis and integration, advanced cost estimating, survivability, integrated flight and propulsion control and carrier suitability.
- (U) (\$ 8,853) Continue technology maturation demonstrations and assessments in the area of autonomic logistics (formerly supportability and training) and complete prognostics and health management technology maturation demonstrations and assessments.
- (U) (\$ 9,030) Continue modeling and simulation activities to support strike warfare mission area analysis and requirements analysis efforts including COPT to facilitate the Services' joint requirements definition. Support analysis as required for final Joint Operational Requirements Document (JORD) coordination and signature. Continue modeling and simulation support testing, training, and refinement of concept of operations for the weapons system (simulation based acquisition).
- (U) (\$ 15,377) Continue mission support, including program office functions.
- (U) (\$522,896) Total

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3. (U) FY 2001 PLAN: (Breakout reflects Navy, Air Force, UK, Multi-Lateral and Canadian funding)

- (U) (\$110,552) Complete Concept Demonstration efforts by Boeing, Lockheed Martin and Pratt & Whitney including ground and flight demonstrations, areas of technology maturation and concept refinement for a tri-service family of aircraft.
- (U) (\$ 94,000) Complete the Alternate Engine Phase IIIA effort (Common Core Design Trade Studies) in this Program Element. (Alternate Engine Development Program will continue in JSF E&MD, Program Elements 0604800N and 0604800F.)
- (U) (\$ 38,137) Complete technology maturation demonstrations and assessments in the areas of airframe, flight systems, manufacturing and producibility, mission systems, propulsion and autonomic logistics. Complete systems engineering support for the Concept Demonstration Phase in the areas of system test, air vehicle analysis and integration, advanced cost estimating, survivability, integrated flight and propulsion control and carrier suitability. Complete analyses required for Milestone II. Commence and complete source selection evaluation to down-select for final design.
- (U) (\$ 5,000) Complete modeling and simulation activities to support required Milestone II analyses. Complete modeling and simulation support testing, training, and refinement of concept of operations for the weapons system (simulation based acquisition).
- (U) (\$ 15,715) Complete mission support, including program office functions.
- (U) (\$263,404) Total

(U) B. PROGRAM CHANGE SUMMARY: (Dollars in thousands)

	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>
(U) FY 2000 President's Budget:	\$468,509	\$241,238	\$ 25,762
(U) Appropriated Value:	\$470,902	241,238	
(U) Adjustments from President's Budget:	+ 2,781	- 1,331	+105,804
(U) FY 2001 President's Budget Submit:	\$471,290	\$239,907	\$131,566

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(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY 1999 net increase of +\$2,781 thousand reflects an increase to preclude reduction of Boeing and Lockheed Martin CDP contracts funding increments, an increase for Contract Advisory and Assistance Services and minor pricing adjustments. FY 2000 decrease of -\$1,331 thousand reflects an across-the-board congressional rescission. FY 2001 net increase of \$105,804 thousand reflects a transfer of funds from E&MD to Concept Demonstration Program (CDP) to cover alternate engine program and CDP requirements and minor pricing adjustments.

(U) Schedule: Completion of the Operational Requirements Document (ORD) has moved from December 1999 to March 2000 due to Joint Requirements Oversight Council (JROC) scheduling problems.

(U) Technical: Not applicable.

(U) C. OTHER PROGRAM FUNDING SUMMARY: (Dollars in thousands) This is a joint program with no executive service. The United Kingdom is a collaborative partner in this phase of the program and several other countries also participate.

<u>Appn</u>	<u>FY 1999</u> <u>ACTUAL</u>	<u>FY 2000</u> <u>BUDGET</u>	<u>FY 2001</u> <u>ESTIMATE</u>	<u>FY 2002</u> <u>ESTIMATE</u>	<u>FY 2003</u> <u>ESTIMATE</u>	<u>FY 2004</u> <u>ESTIMATE</u>	<u>FY 2005</u> <u>ESTIMATE</u>	<u>TO</u> <u>COMPLETE</u>	<u>TOTAL</u> <u>PROGRAM</u>
(U) RDT&E									
0603800F	\$456,137	\$249,088	\$129,538	0	0	0	0	0	\$1,695,723
(U) RDT&E									
0603800E	0	0	0	0	0	0	0	0	\$118,006
(U) UNITED									
KINGDOM	\$34,096	\$26,101	0	0	0	0	0	0	\$200,291
(U) MULTI-									
LATERAL	\$7,500	\$5,100	\$1,700	0	0	0	0	0	\$32,100
(U)									
CANADA	\$3,000	\$2,700	\$600	0	0	0	0	0	\$10,600
(U)									
ITALY	\$10,000	0	0	0	0	0	0	0	\$10,000

(U) RELATED RDT&E:

Milestone II for E&MD of the Joint Strike Fighter (JSF) is planned in FY 2001.

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	FY 1999 ACTUAL	FY 2000 BUDGET	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	FY 2004 ESTIMATE	FY 2005 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
(U) RDT&E 0604800F	0	0	\$299,540	\$1,321,726	\$1,927,241	\$1,853,319	\$1,631,937	TBD	TBD
(U) RDT&E 0604800N	0	0	\$295,962	\$1,324,048	\$1,932,487	\$1,859,938	\$1,639,111	TBD	TBD

Excludes anticipated foreign funding which is TBD. December 1998 Selected Acquisition Report (SAR) reflected total E&MD cost estimate of \$19.8B (\$TY) funded by USN, USAF, and anticipated (but not finalized) foreign sources

(U) RELATED PROCUREMENT FUNDING:

Advanced Procurement for the Joint Strike Fighter (JSF) is planned in FY 2004.

	FY 1999 <u>ACTUAL</u>	FY 2000 <u>BUDGET</u>	FY 2001 <u>ESTIMATE</u>	FY 2002 <u>ESTIMATE</u>	FY 2003 <u>ESTIMATE</u>	FY 2004 <u>ESTIMATE</u>	FY 2005 <u>ESTIMATE</u>	<u>TO</u> <u>COMPLETE</u>	<u>TOTAL</u> <u>PROGRAM</u>
(U) USAF 0207142F	0	0	0	0	0	\$18,000	\$587,308	TBD	TBD
(U) APN-1 0204800N	0	0	0	0	0	0	\$57,735	TBD	TBD

(U) D. ACQUISITION STRATEGY:

Program activities center around three distinct objectives that provide a sound foundation for the start of Engineering and Manufacturing Development (E&MD) in 2001:

- (1) facilitating the Services' development of fully validated, affordable operational requirements;
- (2) lowering risk by investing in and demonstrating key leveraging technologies that lower the cost of development, production and ownership; and
- (3) demonstrating operational concepts.

Early warfighter and technologist interaction is an essential aspect of the requirements definition process, and key to achieving JSF affordability goals. To an unprecedented degree the JSF Program is using cost-performance trades early, as an integral part of the weapon system development process. The Services are defining requirements through an iterative process, balancing weapon system capability against life cycle cost at every stage. Each iteration of requirements is provided to industry. They evolve their designs and provide cost data back to the warfighters. The warfighters evaluate trades and make decisions for the next iteration. This process produced the Services' first Joint Initial Requirements Document (JIRD I) in 1995 and the second and third iterations in 1997 and 1998, respectively. The Services continue to refine their requirements through this process, which will culminate in the Operational Requirements Document (ORD) in FY 2000 to support the Milestone II decision.

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A sizable technology maturation effort is underway to reduce risk and life cycle cost (LCC) through technology maturation and demonstration. The primary emphasis is on technologies which have been identified as high payoff contributors to affordability, supportability, survivability and lethality. Numerous demonstrations have been accomplished and others are in process to validate performance and life cycle cost impact to component, subsystem, and the total system.

A multi-year \$2.2 billion JSF Concept Demonstration effort commenced in November 1996 with competitive contract awards to Boeing and Lockheed Martin for Concept Demonstration Programs. These competing contractors will build and fly concept demonstrator aircraft, conduct concept unique ground demonstrators, and continue refinement of their ultimate delivered weapon system concepts. Specifically, Boeing and Lockheed Martin will demonstrate commonality and modularity, STOVL hover and transition, and low speed handling qualities of their respective weapon system concepts. Pratt and Whitney is providing propulsion hardware and engineering support for both Boeing's and Lockheed Martin's on-going JSF Concept Demonstration efforts. The JSF Concept Demonstration approach has several benefits:

- (1) maintains the competitive environment prior to E&MD and provides for two different STOVL approaches and two different aerodynamic configurations
- (2) demonstrates the viability of a multi-service family of variants with high commonality and modularity between CTOL, CV, and STOVL variants
- (3) provides affordable and low risk technology transition to the JSF E&MD phase.

The JSF Alternate Engine Program, with General Electric, continues development of an alternate engine for production.

Downselect to a single prime weapon system contractor for E&MD and Milestone II are planned in FY 2001. JSF production is planned to begin in FY 2005.

(U) E. SCHEDULE PROFILE:

Dec 94 Commenced Concept Development Phase
Mar 96 Released RFP for Concept Demonstration Efforts
May 96 Designated a joint, DOD, Acquisition Category ID Program by USD(A&T)
Nov 96 Competitively Awarded Concept Demonstration Contracts to Boeing and Lockheed Martin
Mar 00 Complete Operational Requirements Document (ORD)
Mar 01 Milestone II for JSF E&MD

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PROJECT NUMBER:	D2209
PROJECT NUMBER:	2025
PROJECT NUMBER:	JA-01
PROJECT NUMBER:	UK
PROJECT NUMBER:	ML
PROJECT NUMBER:	CAN
PROJECT NUMBER:	ITALY
PROJECT TITLE:	JSF

[illegible]

Strike Warfare Concept Studies (Total Prior to FY 2001)

Technology Maturation Concept Exploration Phase (Total Prior to FY 2001)

Strike Warfare Systems Design Development (Total Prior to FY 2001)

Seattle WA

St. Louis MO

Pico Rivera CA

Fort Worth TX

Various	Fld. Activ.	<u>8,322</u>	<u>8,322</u>
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ASTOVL (Total Prior to FY 2001)

SS/CPFF	Boeing	11,200	11,200
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SUBTOTAL	43,155	43,155
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Various	Fld. Activ.	2,522	2,522
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Exhibit R-3, RDT&E Cost Analysis
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EXHIBIT R-3, FY 2001 RDT&E,N COST ANALYSIS

DATE: February 2000

<u>Cost Categories:</u>	<u>Contract Method</u>	<u>Performing Activity & Location</u>	<u>Total FY 1998 & Prior</u>	<u>FY 1999 Cost</u>	<u>FY 1999 Award Date</u>	<u>FY 2000 Cost</u>	<u>FY 2000 Award Date</u>	<u>FY 2001 Cost</u>	<u>FY 2001 Award Date</u>	<u>Cost To Complete</u>	<u>Total Cost</u>	<u>Target Value of Contract</u>
<u>Weapon System Concept Demonstrations (including flying demonstrators and supporting propulsion efforts)</u>												
	C/CPFF	Boeing *	291,356	269,627	Oct 98	156,761	Oct 99	16,269	Oct 00		734,013	734,013
	C/CPFF	Lockheed *	349,423	280,122	Oct 98	153,931	Oct 99	14,083	Oct 00		797,559	797,559
	SS/CPFF	Pratt & Whitney * West Palm Beach FL	537,405	212,666	Nov 98	84,200	Nov 99	80,200	Nov 00		914,471	951,861

*includes government managed equipment

Note: Consistent with recent Boeing and Lockheed Martin replans, annual funding increments reflect budgeted basic Concept Demonstration Program (CDP) efforts as well as areas of technology maturation. Boeing and Lockheed Martin Target Value of Contract reflects total contract funding requirements.

Pratt and Whitney Total Value of Contract reflects award fees totaling \$35.1M, FY 1998 and prior, basic CDP efforts and technology maturation efforts in Propulsion and Prognostics and Health Management.

Award Fees

SUBTOTAL			1,178,184	762,415		394,892		110,552			2,446,043	
<u>Alternate Engine Program</u>												
	SS/CPFF	GE	7,000								7,000	
		Cincinnati OH									0	
	SS/CPFF	GE	61,794	40,153	Nov 98	26,190	Oct 99	94,000	Oct 00		222,137	225,137
SUBTOTAL			68,794	40,153		26,190		94,000			229,137	

Note: The Target Value includes Propulsion Technology Maturation efforts.

Technology Maturation

Airframe

	SS/CPFF	McAir	19,240								19,240	
	Various	Miscellaneous	1,985	94	Various	44	Various	45	Various		2,168	
	Various	Fld. Activ.	4,236	1,137	Nov 98	1,376	Nov 99	1,455	Nov 00		8,204	
SUBTOTAL			25,461	1,231		1,420		1,500			29,612	

Flight Systems

	C/CPFF	Lockheed	41,515	9,807	Nov 98	1,378	Nov 99				52,700	
	C/CPFF	McAir	46,901	17,920	Nov 98	1,000	Nov 99				65,821	
	Various	Miscellaneous	9,090	650	Nov 98	60	Nov 99	805	Various		10,605	
	Various	Fld. Activ.	13,491	4,212	Nov 98	4,230	Nov 99	2,515	Nov 00		24,448	
SUBTOTAL			110,997	32,589		6,668		3,320			153,574	

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<u>Cost Categories:</u>	<u>Contract Method & Type</u>	<u>Performing Activity & Location</u>	<u>Total FY 1998 & Prior</u>	<u>FY 1999 Cost</u>	<u>FY 1999 Award Date</u>	<u>FY 2000 Cost</u>	<u>FY 2000 Award Date</u>	<u>FY 2001 Cost</u>	<u>FY 2001 Award Date</u>	<u>Cost To Complete</u>	<u>Total Cost</u>	<u>Target Value of Contract</u>
<u>Manufacturing and Producibility</u>												
	C/CPFF	Hughes	5,065								5,065	
		Los Angeles CA										
	C/CPFF	Lockheed	7,500	2,100	Nov 98	600	Nov 99				10,200	
		General Res.										
	C/CPFF	Corp.	1,945								1,945	
		Huntsville AL										
	C/CPFF	Scaled Composites	2,000								2,000	
	C/CPFF	Lockheed	700								700	
	Various	Miscellaneous	1,343	201	Various	75	Various	60	Various		1,679	
	Various	Fld. Activ.	<u>3,286</u>	<u>1,374</u>	Nov 98	<u>558</u>	Nov 99	<u>1,470</u>	Nov 00		<u>6,688</u>	
SUBTOTAL			21,839	3,675		1,233		1,530			28,277	
<u>Propulsion</u>												
	C/CPFF	Pratt/Whitney	5,448								5,448	
	SS/CPFF	GE	5,681								5,681	
	SS/CPFF	Pratt/Whitney	30,000								30,000	
	SS/CPFF	GE	3,000								3,000	
	SS/CPFF	Pratt/Whitney	22,988	3,789	Jan 99						26,777	
	SS/CPFF	Pratt & Whitney	3,640								3,640	
	SS/TBD	Pratt & Whitney	7,000	1,200	Dec 98						8,200	
	NASA Contract		700	2,100	Jul 99						2,800	
	Various	Miscellaneous	12,895	1,804	Various	48	Various	50	Various		14,797	
	Various	Fld. Activ.	<u>24,484</u>	<u>15,389</u>	Nov 98	<u>7,197</u>	Nov 99	<u>2,950</u>	Nov 00		<u>50,020</u>	
SUBTOTAL			115,836	24,282		7,245		3,000			150,363	
<u>Mission Systems</u>												
	C/CPFF	TI	2,464								2,464	
		Plano TX										
	SS/CPFF	Lockheed	6,856								6,856	
	SS/CPFF	McAir	6,524								6,524	
	C/CPFF	Raytheon	27,274	17,899	Nov 98						45,173	
	C/CPFF	Northrop/Grumman	25,946	15,957	Nov 98						41,903	
	C/CPFF	Boeing	1,575								1,575	
	C/CPFF	Lockheed	1,517								1,517	
	C/CPFF	Hughes	3,681								3,681	
	Classified		2,000	1,000	Nov 98						3,000	
	Various	Miscellaneous	20,097	1,467	Various	2,139	Various	2,389	Various		26,092	
	Various	Fld. Activ.	<u>22,283</u>	<u>5,352</u>	Nov 98	<u>7,383</u>	Nov 99	<u>7,566</u>	Nov 00		<u>42,584</u>	
SUBTOTAL			120,217	41,675		9,522		9,955			181,369	

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	Contract	Performing	Total		FY 1999		FY 2000		FY 2001		Target	
	Method	Activity &	FY 1998	FY 1999	Award	FY 2000	Award	FY 2001	Award	Cost To	Total	Value of
Cost Categories:	& Type	Location	& Prior	Cost	Date	Cost	Date	Cost	Date	Complete	Cost	Contract
Systems Engineering Support												
	Various	Miscellaneous	11,993	8,573	Various	10,011	Various	3,129	Various		33,706	
	Various	Fld. Activ.	64,969	28,635	Nov 98	31,535	Nov 99	7,339	Nov 00		132,478	
	SUBTOTAL		76,962	37,208		41,546		10,468			166,184	
Autonomic Logistics (formerly Prognostics and Health Management/Supportability and Training)												
	C/CPFF	Pratt & Whitney	10,100								10,100	
	C/CPFF	General Electric		1,500	Jan 99						1,500	
	C/CPFF	Classified										
	C/CPFF	Project 3	7,826	750	Jan 99						8,576	
	C/CPFF	Project 4	4,799	750	Jan 99						5,549	
	Various	Miscellaneous	2,271	2,281	Various	5,661	Various	1,117	Various		11,330	
		Fld. Activ.	7,677	4,030	Nov 98	3,192	Nov 99	6,327	Nov 00		21,226	
	SUBTOTAL		32,673	9,311		8,853		7,444			58,281	
Modeling, Simulation, Analysis, Threat, COPT and Core Support												
	Various	Miscellaneous	37,719	5,033	Various	3,277	Various	690	Various		46,719	
	Various	Fld. Activ.	19,008	7,874	Nov 98	5,353	Nov 99	3,910	Nov 00		36,145	
	SUBTOTAL		56,727	12,907		8,630		4,600			82,864	
Mission Support												
	Grant	Institute for Defense Anal	2,500								2,500	
	Various	Fld. Activ.	20,633	5,709	Various	5,972	Various	6,210	Various		38,524	
	SUBTOTAL		23,133	5,709		5,972		6,210			41,024	
Subtotal Project Development			2,006,989	971,155		512,171		252,579			3,742,894	
SUPPORT (CS)												
	SS/CPFF	ANSER	19,541	4,720	Jan 99	4,720	Jan 00	4,720	Jan 01		33,701	
		Arlington VA										
	Various	Miscellaneous	14,373	6,148	Various	6,005	Various	6,105	Various		32,631	
Subtotal Support			33,914	10,868		10,725		10,825			66,332	

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	Contract	Performing	Total		FY 1999		FY 2000		FY 2001			Target
	Method	Activity &	FY 1998	FY 1999	Award	FY 2000	Award	FY 2001	Award	Cost To	Total	Value of
<u>Cost Categories:</u>	<u>& Type</u>	<u>Location</u>	<u>& Prior</u>	<u>Cost</u>	<u>Date</u>	<u>Cost</u>	<u>Date</u>	<u>Cost</u>	<u>Date</u>	<u>Complete</u>	<u>Cost</u>	<u>Contract</u>

TEST AND EVALUATION: (included above)

MANAGEMENT: N/A

Total Cost			2,040,903	982,023		522,896		263,404			3,809,226	
Funding Resources												
0603800N			899,743	471,290		239,907		131,566			1,742,506	
0603800F			860,960	456,137		249,088		129,538			1,695,723	
0603800E			118,006								118,006	
United Kingdom			140,094	34,096		26,101					200,291	
Multi-Lateral			17,800	7,500		5,100		1,700			32,100	
Canada			4,300	3,000		2,700		600			10,600	
Italy			<u>0</u>	<u>10,000</u>		<u>0</u>		<u>0</u>			<u>10,000</u>	
Total			2,040,903	982,023		522,896		263,404			3,809,226	

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Exhibit R-3, RDT&E Cost Analysis
(Exhibit R-3, Page 12 of 12)

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